Ferroelectricity Newsletter

A quarterly update on what's happening in the field of ferroelectricity

Volume 8, Number 1 Winter 2000

COMING BACK ON TRACK

When you got the fall 1999 issue a few days before the beginning of spring 2000, many of you must have chuckled or at least wondered what we were talking about when we thanked Professor Wolfgang Haase and his helpers for providing us the report on the International Conference on Ferroelectric Liquid Crystals, held from 29 August to 3 September 1999, "in such a timely fashion." As a matter of fact, that issue of the *Ferroelectricity Newsletter* was ready at the end of last October but could not be published because of bureaucratic mix-ups and delays. Both the winter 2000 issue, followed at the heels by the spring 2000 issue, will come out this month of May so that we will be back on track for the summer issue in July.

A big part of this issue is devoted to the Second Asian Meeting on Ferroelectricity (AMF-2) held 7–11 December 1998 in Singapore and reflects the strong growth and active development of ferroelectric research in Asia, but also shows that AMF has become an international forum for the ferroelectric community around the world.

The next set of papers gives you a preview of what is going to happen at the Seventeenth Conference on Crystal Growth and Epitaxy, sponsored by the American Association for Crystal Growth/Western Regional Section from 4–7 June at the idyllic Stanford Sierra Camp at Fallen Leaf Lake near Lake Tahoe in California.

The same overall framework is also the theme of the 12th American Conference on Crystal Growth and Epitaxy (ACCGE-12) to take place from 13–18 August in Vail, Colorado. You will find details on page 15 of this issue.

Researchers and users of ferroelectric sensors might want to turn to page 9 for details on an upcoming high quality, affordable journal in this particular field. The inaugural issue is scheduled for June 2001 and scientists are invited to submit papers by 1 September 2000.

The next issues of the *Ferroelectricity Newsletter* will feature two important conferences: the 9th European Meeting on Ferroelectricity (EMF-9), held in Prague, Czech Republic, 12–16 July 1999; and the 12th International Symposium on Integrated Ferroelectrics (ISIF 2000), held in Aachen, Germany, 12–15 March 2000.

Rudolf Panholzer
Editor-in-Chief

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AMF-2 PAPERS

THE SECOND ASIAN MEETING ON FERROELECTRICITY (AMF-2)

The Second Asian Meeting on Ferroelectricity took place from 7 – 11 December 1998 in Singapore. The proceedings of the conference were published in Volumes 229, 230, 231, and 232 (1999) of **Ferroelectrics.**

Guest Editors Professors Zhu Weiguang and Yao Xi *wrote in their editorial: "The AMF-2 received 345 abstracts and scheduled 310 (43 invited) presentations with 203 registered participants. The participants and papers came from 22 countries and regions in five continents: China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Singapore, and Taiwan (Asia); Finland, France, Germany, Israael, Latvia, Russia, Slovenia, Switzerland, and the United Kingdom (Europe); Canada and USA (North America); Australia (Pacific); and Brazil (South America). … These figures of AMF-2 give not only a clear indication and testimony of the strong growth and active development of ferroelectric research in Asia, but also show that AMF has become an international forum for the ferroelectric community around the world, not just for the Asian community."*

The following is a list of topics and authors of the presentations as published in the proceedings.

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Ferroelectric particles described by the transverse Ising model
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Phase transition properties of ferroelectric thin films with diluted surfaces
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Landau theory of ferroelectric films with asymmetric behavior
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Theoretical analysis of optimal QPM-SHG waveguide structure in KTP substrates
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Structural modulation in perovskite-like cuprates
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Local structural distortions, discommensurations, stripes and precursor domains in ferroelectric perovskites
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Semi-empirical Hartree-Fock calculations for interacting Li impurities in $KTaO_3$
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Computer simulations of defects in perovskite $KNbO_3$ crystals
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Monte-Carlo simulation of the *P-E* hysteresis and domain switching in ferroelectric Potts lattice
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J.-M. Liu, C.K. Ong, and L.C. Lim

Effect of substrate temperature on ferroelectric properties of $(Pb_{1-x}La_x)Ti_{1-x/4}O_3/SrRuO_3$ thin films
H.-F. Cheng and I-N. Lin

Fabrication and structural properties of sol-gel $Sr_{0.6}Ba_{0.4}Nb_2O_6$ (SBN60) films
G. K.H. Pang, C.H. Luk, C.L. Mak, and K.H. Wong

Preparation of bilayered ferroelectric thin film by thermal MOCVD
H. Funakubo, N. Nukaga, K. Ishikawa, H. Kokubun, H. Machida, K. Shinozaki, and N. Mizutani

Substrate effect on $Pb_{0.6}Sr_{0.4}TiO_3$ thin film growth by pulsed laser deposition
C.-S. Hou, H.-C. Pan, C.-C. Chou, and H.-F. Cheng

Correlation between morphological and electrical characteristics of $Pt/SrBi_2Ta_2O_9/CeO_2/Si$ capacitors
H.N. Lee, S.H. Choh, D.S. Shin, and Y.T. Kim

Growth and micro-Raman study of RF magnetron sputter deposited $PbTiO_3$ thin films
S. Srinivas, S. Bhaskar, and R.S. Katiyar

Investigation on formation mechanism of MOD derived PLT ferroelectric thin films
W. Xiaoqing, R. Wei, Z. Liangying, and Yao Xi

Nonplanar piezoelectric film structures
S. Leppävuori, A. Kruusing, and A. Uusimäki

Piezoelectric properties of micromachined cantilevere PLZT thin films
C.-H. Cheng, Y. Xu, H.B. Cherry, J. Tseng, G. Um, W. Wen, and J.D. Mackenzie

DEVICE APPLICATIONS

Study of hydrogen polarization potential in MFM device using amorphous $(Ba,Sr)TiO_3$-type thin films and hydrogen gas sensing properties
W. Zhu, O.K. Tan, J. Deng, and X. Yao

The application of ferroelectric materials in microelectromechanic systems (MEMS)
Z. Shoubai, G. Xiaoyun, and X. Juntao

Composite ultrasonic motors using a piezoelectric disc and an elastic body of "windmill" type
J.-S. Kim, M.-J. Park, and K. Uchino

Sol-gel processing of piezoelectric thin films
I.R. Abothu, Y. Ito, P. Poosanaas, S. Kalpat, S. Komarneni, and K. Uchino

AMF-2 PAPERS

Engineering resonance frequency charts of PZT rings of different sizes and at different clamping conditions
Y. Xu, B. Koc, K. Uchino, and L.L. Chew

Sensors for ultrasonic wire bonding process control
S.S. Chiu, H. Lai Wah Chan, S.W. Or, Y.M. Cheung, C.W. Yuen. and P.C.K. Liu

Effect of tool drop on the performance of high-frequency piezoelectric wire-bonding transducer system
S.W. Or, H. Lai Wah Chan, K.C. Cheng, Y.M. Cheung, C.W. Yuen, and P. C.K. Liu

Effect of grain sizes on piezoelectric properties of multilayer thick film actuators
Z. Zhang, W. Zhu, and K. Yao

Piezoelectric ultrasonic motor and fine positioner with two freedoms
D. Shuxiang, W. Shuxin, and L. Longtu

Piezoelectric-electrorheological planar stepper motor
D. Shuxiang, S. Wenjiang, Q. Hongyun, and L. Longtu

New designed longitudinal and torsional vibrator combination-type ultrasonic motor
M. Aoyagi and Y. Timokawa

$Pb(Zr,Ti)O_3$ film fabrication by sol-gel method for piezoelectric actuated device
B.J. Kim, J. Lee, J.B. Yoo, and K.S. No

A standing wave type ultrasonic motor
T. Zhou, L. Chai, C. He, Y. He, and A. Kuang

Photostrictive actuators and some of its characteristics
M. Ichiki, J. Akedo, Y. Morikawa, K. Ozaki, M. Tanaka, and Y. Ishokawa

FERROELECTRIC SENSOR PAPERS WANTED

The IEEE established the Sensors Council in 1999 for the purpose of creating a focus for the sensor activities of IEEE societies, and for starting a high quality, affordable journal. (The major competing journal costs $5,200 per year.) The Council has 26 member societies, with a combined membership of 260,000.

Sensor researchers and users are invited to submit papers and help make the IEEE Sensors Journal the leading sensor publication in the world. Papers on sensor applications are of special interest.

The inaugural issue is scheduled for June 2001. It will consist of a collection of review papers, covering a wide range of sensor technologies. The deadline for submissions is 1 September 2000. The call for papers, and other relevant information can be found on the Sensors Council website, **http://www.ieee.org/sensors**.

The subscription price will be $19 per year for IEEE members. The nonmember (institutional) price will be $495 per year.

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CRYSTAL GROWTH PAPERS

17TH CONFERENCE ON CRYSTAL GROWTH AND EPITAXY

The Seventeenth Conference on Crystal Growth and Epitaxy, sponsored by the American Association for Crystal Growth/Western Regional Section, will take place from 4–7 June 2000 at the Stanford Sierra Camp, Fallen Leaf Lake, California. The following is a list of topics and authors of the oral and poster presentations to be given at the conference.

FUNDAMENTALS OF EPITAXY

MBE-based GaN growth on sapphire and lithium gallate substrates
A.S. Brown, W.A. Doolittle, S. Kang, G. Namkoong, K. Lee, G. May, Z. Dai, and Z.L. Wang

Real-time X-ray studies of MOCVD growth of GaN
G.B. Stephenson, A. Munkholm, M.V. Ramana Murty, J.A. Eastman, C. Thompson, O. Auciello, P. Fini, S.P. DenBaars, and J.S. Speck

Relaxed SiGe growth: Materials issues in creating the integation platform of the future
E.A. Fitzgerald

Three-dimensional island nucleation in Si/Ge(111) and Ge/Si(001) epitaxy
A. Raviswaran, A. Vailionis, C.P. Liu, and D.G. Cahill

BULK SEMICONDUCTORS

Recent developments of semi-insulating GaAs crystal growth
P. Rudolph and M. Neubert

Melt growth of III-V/II-Vi quaternary compounds
C. Martin and A.G. Ostrogorsky

Improvements for CZ silicon
G. Mihalik and B. Frickett

Characterization of dopants in germanium: Neutron activity analysis and inductively coupled plasma mass spectrometry
L. Keefer and D.H. Matthiesen

Light scattering tomography: a nondestructive technique for studying defects in crystals
R. DeMattei and R.S. Feigelson

PATTERNED GROWTH/ STRAINED EPITAXY

Uniform quantum wire and quantum dot array by functional self-organized nanostructure epitaxy
R. Noetzel

Alloy decomposition in strained layers and quantum dots
J. Tersoff

Film defects, growth dynamics, and device performance in gallium nitride epitaxy
F. Ponce

Morphological evolution in strained semiconductor thin films: The old, the new, and the unexpected
J.M. Millunchick

OXIDE SURFACE DYNAMICS

Imposed layer-by-layer growth of complex oxides with pulsed laser *interval* deposition
D.H.A. Blank

MBE growth of cuprates and other complex oxides studied in real time by LEEM, TOF-ISARS, and RHEED
I. Bozovic and V. Matijasevic

Under the microscope: Nanoscopic sintering and oxidation in the UHV TEM
M. Yeadon, J.C. Yang, C. Zimmermann, R.S. Averback, and J.M. Gibson

Oxide surfaces and thin film epitaxy
X.Q. Pan

NEW FRONTIERS IN OXIDE CRYSTAL GROWTH

Industrial scale production of LSO crystals for medical imaging
B.H.T. Chai, Y.Y. Ji, R. Becker, and M. Stowell

Langasite structure compounds for BAW and SAW device applications
A.N.P. Bustamante anbd B.H.T. Chai

Zinc oxide (ZnO) substrates
J. Nause, V. Munne, D. Look, and H. Morkoc

Growth of large lead magnesium niobate-titanate single crystals by the Bridgman technique
M.C.C. Custodio, Y.-T. Fei, S.-G. Lee, and R.S. Feigelson

SUBSTRATE ENGINEERING/WAFER BONDING/ COMPLIANT SUBSTRATES

Transplanted Si films on arbitrary substrates using GaN underlayers
S. Guha, A. Gupta, N.A. Bojarczuk, and J. Karasinski

CRYSTAL GROWTH PAPERS

Microfabrication of silicon by the ion cut process
N. Cheung

Heterogeneous materials integration: From wafer bonding to self-assembly
T.P. Mayer

Wafer bonding of 3" diameter AlGaInP light-emitting diode wafers to GaP substrates
D. Wynne, I.-H. Tan, N. Hamaguchi, D. Vanderwater, J.-W. Huang, J. Walker, G. Hofer, F. Kish, E. Chen, T. Osentowski, and S. Stockman

Crystal ion slicing of metal oxides: Lift-off and bonding
R.M. Osgood and M. Levy

POSTER SESSION

Study of the alternate precursor dimethylhydrazine for MOVPE of hexagonal GaN on sapphire
E. Bourret-Courchesne

Thermoelectric properties of some phosphorous-based Skutterudie materials
A. Watcharapasorn, R.C. DeMattei, R.S. Feigelson, T. Caillat, A. Borshchevsky, G.J. Snyder, and J.-P. Fleurial

Analysis of defects in the as-grown, low energy hydrogen and nitrogen ion implanted SI-GaAs single crystals by RBS/channeling measurements
M. Udhayasankar, K. Sekar, B. Sundaravel, J. Kumar, and P. Ramasamy

LEC grown SI-GaAs and SI InP surface detectors for nuclear radiation detection
P. Jayavel, S. Gosh, A. Jhingan, D.K. Avasthi, K. Asokan, and J. Kumar

Preparation of $La_{2-x}Sr_xCuO_4$ single crystalline films by the LPE technique using an infrared heating furnace
I. Tanaka, K. Ashizawa, H. Tanabe, and S. Watauchi

Control of the anisotropic growth rate in FZ growth
S. Watauchi, M. Wakihara, and I. Tanaka

Crystal growth by the Bridgman technique using vibrational control
K.T. Zawilski, R.S. Feigelson, M.C.C. Custodio, E.V. Zharikov, and I.S. Avetisov

TEM study of the influence of the incorporation of an interlayer on the structural characteristics of GaN and GaAsN
M. Benamara, Z. Liliental-Weber, W. Swider, J. Washburn, S. Kellermann, and E. Bourret-Courchesne

5x3" group-III nitride growth in production scale MOVPE systems
H. Protzmann, B. Schineller, M. Luenenbuerger, M.D. Bremser, M. Heuken, and H. Juergensen

Growth evolution, adatom condensation, and island sizes in InGaAs/GaAs(001)
R. Leon, J. Wellman, X.Z. Liao, and J. Zou

Structural and electrical investigations of silicon wafer bonded interfaces
M. Benamara, A. Rocher, A. Claverie, and F. Grey

Effects of Sb surfactant-mediated growth on dislocations in $Si_{1-x}Ge_x$
R.L. Forrest, M.S. Goorsky, J.L. Liu, and K.L. Wang

Hydrophobic wafer bonding using H+ implantation splitting
C. Miclaus, M.S. Goorsky, H. Kim, and Y.H. Xie

Ferroelectricity Newsletter
including all back issues is available on Internet
http://www.sp.nps.navy.mil/projects/ferro/ferro.html
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UPCOMING MEETINGS

The Sixth International Symposium on Ferroic Domains and Mesoscopic Structures (ISFD-6)
29 May - 2 June 2000
NanjingNanjing University, Nanjing 210093, China

This meeting will bring together experts from all over the world to exchange their updated research results, discuss the latest advances, and form international collaborations in advanced fundamental understanding, fabrication control, and application design of mesoscopic structures in ferroic material.

The meeting themes focus on domains and other mesoscopic structures in ferroic materials, including ferroelectrics and ferroelastics, in forms of bulk and thin films. These materials possess many useful physical properties, such as nonlinear optical, pyroelectric, photorefractive, shape memory, piezoelectric effects, etc. They are widely used in nonlinear optics, holography, ultrasonic transducers, and sensors. Recently many new amazing effects have been found relating to domains and mesoscopic structures, including antifatigue effect in layered ferroelectrics, enhancement of dielectric constants in ferroelectric superlattices, and high electromechanical coupling coefficients in relaxor-based ferroelectrics. These novel phenomena have generated great expectations in practical applications. ISFD-6 will further expand the effort of ISFD-5 on the application of ferroic materials with engineered mesoscopic structures.

In as-prepared ferroic materials, domains usually distribute randomly. Under certain conditions, they can be tailored to arrange according to predesigned patterns (at least in ferroelectric). In this way, the physical properties can be modulated artificially through the control of domains. In order to better utilize techniques for domain control, a more fundamental understanding of mechanism of microstructure formation and property/microstructure relations is urgently needed. There are many challenges associated with the formation of microstructures, such as phase transitions, grain size, and boundary effects, thermal processes, fabrication conditions, and characterization methods. Evidence showed that phase transition can be driven not only by temperature and pressure but also by grain size and composition variations. Such complex problems require tackling of multiple disciplines.

Topics

- Structure and characterization
- Statics, dynamics, and switching of ferroic domains
- Theory of domains and phase transition
- Thin films, multilayers, and domain engineering
- Relaxor ferroelectrics
- Devices and applications

Organization Committee

Co-Chairs D. Feng and S.S. Jiang
N.B. Ming, X. Yao, Y.N. Wang, Z.W. Yin, Z.G. Liu, and W.L. Zhong

Program Committee

D.Y. Xing, Y.Y. Zhu, S.N. Zhu, J.M. Liu, X.S. Wu, J.S. Zhu, M. Gu, M. Qi, W.Y. Zhang

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Website

http:\\202.119.45.130 (Chinese)
http:\\202.119.45.130\casstme.htm (English)

UPCOMING MEETINGS

MRS Workshop on High-*k* Gate Dielectrics
1 - 2 June 2000
New Orleans Marriott, New Orleans, Louisiana, USA

The scaling of the gate oxide in CMOS technology has rapidly accelerated over the past several years. This rate of scaling is manifested by the 1999 ITRS timeline, which now calls for an SiO_2 gate oxide thickness of less than 2.0 nm for sub-0.13 μm technology nodes. This extremely aggressive march toward ultrathin oxide layers has placed a very high priority on finding a high-*k* replacement for SiO_2 that will allow CMOS scaling to continue at this remarkable pace.

This MRS workshop will span two days of invited presentations to create a focused meeting on the topic of high-*k* gate dielectrics. It is intended to bring together all of the leading researchers in this field for discussion on the critical issues which must be addressed and solved in order for high-*k* materials to successfully replace SiO_2. Along these lines, there will be only minimal discussion on issues related to ultrathin SiO_2. The critical issues will include interface stability, physical and electrical analysis, and CMOS process integration compatibility.

Invited presentation will be 30-45 minutes with appropriate time for in-depth discussion. Two panel discussions will address the key roadblocks facing high-*k* dielectrics. Representatives from major tool vendors will be present at the workshop and in the panel discussions to provide essential information for understanding the requirements of process capability and tool development timelines.

Topics

Scaling/Integration

- SiO_2 limitations/overview alternate approaches
- High-*k* reliability issues
- High-*k* integration/metal gates

Binary Oxides

- RTCVD Ta_2O_5, ZrO_2, HfO_2
- UHV CVD TiO_2, $TiSi_xOy$, ZrO_2
- Sputtering ZrO_2, HfO_2
- plus additional presentations

Complex Oxides

- Zr-Al-O sputtering
- $SrTiO_3$ MBE
- plus additional presentations
- Panel discussion on metal
- Gates, integration, manufacturability (with tool vendor input)

Silicates

- Sputtering of silicates/overview
- Sputtering/CVD Hf-Si-O
- RTCVD of Zr(Hf)-Si-O
- RPECVD of Zr-Si-O, etc.
- MBE approaches

Website www.mrs.org

UPCOMING MEETINGS

MRS Workshop on Transparent Conducting Oxides (TCOs)
19 – 20 June 2000
Denver, Colorado, USA

The second MRS Workshop offering this summer will bring together representatives from industry, national laboratories, and universities to discuss prospects, needs, challenges, and opportunities for TCOs. The expected outcome is the formation of a coordinated effort of research and development for improved and new TCOs by developing synergies between the various sectors represented. Attendees will participate in working group discussions based on key topical areas–large-area deposition; commercialization problems/issues; new TCO materials; fundamental TCO research; and novel applications. A proceedings of the Workshop will be published, providing both a summary of the state of the TCO field as well as a snapshot of the needs and opportunities in the area. The cost of the proceedings volume will be covered in the registration fees for the Workshop.

The Materials Research Society established the MRS Workshop Series in 1999 to deal with highly focused and compelling subjects, as do the MRS Fall and Spring Meeting symposia. Workshops, however, differ significantly in that they allows attendees to focus their full attention on a designated topic over a 2–3-day period; offer much more interaction and discussion between speakers and the audience; limit audience size; and offer attendees a more in-depth review of important topics than is typically allowed in a "snapshot" symposium. The Workshop schedule consists of presentations by acknowledged experts, while also allowing for selected solicited talks and posters.

Organizers

David Ginley and Timothy Coutts, NREL, chairs
Tom Mason, Northwestern University, and Clark Bright, Delta V Technologies, co-organizers

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12th IEEE International Symposium on the Application of Ferroelectrics (ISAF 2000)
30 July - 2 August 2000
Hilton Hawaiian Village, Honolulu, Hawaii, USA

The 12th IEEE International Symposium on the Applications of Ferroelectrics, a biennial meeting, focuses on the topical areas pertaining to the applications of ferroelectric, piezoelectric, dielectric, and electrooptic materials in single crystalline and polycrystalline forms of both bulk and thin-layer bodies. The substance of the meeting will consist of papers including (but not limited to) properties, structure-property-chemical relationships, materials processing, materials and device design, materials and device fabrication, and device testing.

Topics

- Piezoelectric materials for transducers, actuators, ultrasonic imaging, SAW, BAW, high-power devices and smart systems
- Capacitors for discrete components, embedded devices, and on-chip applications
- Pyroelectric materials, infrared imaging, and infrared detection
- Single crystal ferroelectrics and their applications

UPCOMING MEETINGS

- Ferroelectric and dielectric thin films for memory applications
- Novel characterization methods
- Polymeric and liquid crystal ferroelectrics: Displays and soft actuation applications
- Tunable materials for RF and microwave applications
- Modeling and theory
- New materials
- Optical materials and optical interactions
- Energy storage devices and materials
- Thermistor materials
- Ferroelectrics for electron field emission devices

Website http://www2.ncsu.edu/unity/lockers/project/isaf_2000/

12th American Conference on Crystal Growth and Epitaxy (ACCGE-12)
13 – 18 August 2000
Vail Marriott Mountain Resort, Vail, Colorado, USA

ACCGE-12 will provide a forum for the presentation and discussion of recent research and development activities in all aspects of bulk crystal growth and epitaxial thin film growth, with sessions integrating fundamentals, experimental and industrial growth processes, characterization, and applications.

Topics

- Bulk growth of semiconductors
- Crystal growth fundamentals
- Detector materials
- Epitaxial growth
- Evolution of thin films
- Industrial crystallization
- In-situ diagnostics
- Modeling
- MBE–interface formation issues
- NASA microgravity workshop
- NLO, photorefractive, and laser crystals
- Novel materials
- Organometallic vapor phase epitaxy
- Oxides: Substrates and films
- Phase field modeling
- Photovoltaics and thermal photovoltaics
- SiC bulk crystal and epitaxial growth
- Wide gap band materials: Nitrides

NASA Microgravity Workshop

At ACCGE-12, NASA will hold a workshop entitled "Applications of Experimentation in a Microgravity Environment to the Science of Electronic Materials." The workshop will examine potential contributions that experimentation in a microgravity environment will make to the understanding of the production and utilization of materials. The first session will feature presentations on the state of the art in crystal growth of materials by bulk processes, chemical vapor transport, and physical vapor transport, both on the ground and in space; growth of nonlinear optical materials; and measurement of diffusion constants. The second session will be a panel discussion focusing on perspectives of industry especially regarding new directions to be targeted. Topics will include: 1) Bulk crystals: Defect control and composition uniformity in doped and alloyed solid solutions. 2) Vapor transport: Effect of convection on defect and compositional distribution. 3) Nonlinear optical materials: Aspects of defect and compositional control in both organic and oxide NLO materials. 4) Diffusion: Measurement of convection-free parameters in elemental, doped, and alloyed liquids. 5) Magentic fields: Effectiveness in damping convection.

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CALENDAR OF EVENTS 2000

May 14-18	•	4th International Symposium on Micro Total Analysis Systems (μTAS 2000), Enschede, The Netherlands, (see *Ferroelectricity Newsletter*, Vol. 7, No. 4, p. 17)
May 21-24	•	3rd SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, Pennsylvania, USA (see *Ferroelectricity Newsletter*, Vol. 7, No. 4, p. 17)
May 29-Jun 2	•	6th International Symposium on Ferroic Domains and Mesoscopic Structures (ISFD-6), Nanjing, China (see p. 12)
Jun 1-2	•	MRS Workshop on High-*k* Gate Dielectrics, New Orleans, Louisiana, USA (see p. 13)
Jun 4-7	•	17th Conference on Crystal Growth and Epitaxy, Fallen Leaf Lake, California, USA (see p. 10)
Jun 19-20	•	MRS Workshop on Transparent Conducting Oxides (TCOs), Denver, Colorado, USA (see p. 14)
Jul 3-5	•	8th International Meeting on Chemical Sensors, Basel, Switzerland (see *Ferroelectricity Newsletter*, Vol. 7, No. 4, p.18)
Jul 30-Aug 2	•	12th IEEE International Symposium on the Application of Ferroelectrics (ISAF 2000), Honolulu, Hawaii, USA (see p. 14)
Aug 13-18	•	12th American Conference on Crystal Growth and Epitaxy (ACCGE-12), Vail, Colorado, USA (see p. 15)
Aug 27-30	•	5th European Conference on the Application of Polar Dielectrics (ECAPD-5), Jurmala, Latvia (see *Ferroelectricity Newsletter*, Vol. 7, No. 3, p. 17)
Sep 3-6	•	Electroceramics VII, Portoroz, Slovenia (see *Ferroelectricity Newsletter*, Vol. 7, No. 3, p. 18)
Sep 11-14	•	3rd (8) International Seminar on Ferroelastics Physics (ISFP-3(8), Voronezh, Russia. Contact: www.vstu.ac.ru/~ferroelastic/
Sep 25-28	•	International Congress on Advanced Materials, their Processes and Applications, Munich, Germany. Contact: www.materialsweek.org
Nov 27-Dec 1	•	MRS 2000 Fall Meeting, Boston, Massachusetts, USA. Contact: www.mrs.org
Dec 12-15	•	3rd Asian Meeting on Ferroelectrics (AMF-3), Hong Kong, China (see *Ferroelectricity Newsletter*, Vol. 7, No. 3, p. 19)

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